

## CLAIMS

We claim;

1. A CBN sintered body comprising of:
  - CBN grains;
  - metal binders;
  - and an attachment ring of infiltrated cobalt extending from an adjacent, cemented substrate and expanding into the sintered body;
  - and demonstrating a hardness of 3500 HV to 3900 HV.
2. The CBN sintered body of claim 1, wherein the substrate is tungsten carbide with 6% cobalt.
3. The CBN sintered body of claim 1, wherein the CBN grains are 90 to 93 weight percent of the sintered body.
4. The CBN sintered body of claim 1, wherein the CBN grains are 93 to 97 weight percent of the sintered body.
5. The CBN sintered body of claim 1, wherein the CBN grains are 50 to 70 weight percent of the sintered body.
6. The CBN sintered body of claim 1, wherein the CBN grains are 1 to 3 microns.
7. The CBN sintered body of claim 1, wherein 60% of the CBN grains are 4 to 8 microns, 30% of the CBN grains are 12 to 22 microns, and 10% of the CBN grains 1-2 microns.
8. The CBN sintered body of claim 1, wherein the thickness of the attachment ring is 15 to 30 microns.
9. The CBN sintered body of claim 1, wherein titanium carbide is a metal binder.

10. The CBN sintered body of claim 1, wherein titanium nitride is a metal binder.
11. The CBN sintered body of claim 1, wherein aluminum is a metal binder.
12. A process for making a CBN sintered body according to claim 1, which comprises:
  - providing a mixture consisting of CBN grains, with some aluminum nitride grains, some aluminum grains, some titanium grains, and some diamond grains;
  - compacting the mixture adjacent to a substrate into a refractory metal container;
  - then heating the container in vacuum where the diamond reduces the mixture to form a preform of titanium carbide, titanium nitride, and aluminum;
  - and then sintering the preform by exposing it to high temperature and high pressure where cubic boron nitride is stable.
13. The process of claim 12, where the CBN grains comprise 93 to 97 weight percent of the mixture.
14. The process of claim 12, where the CBN grains comprise 90 to 93 weight percent of the mixture.
15. The process of claim 12, where the CBN grains are 50 to 70 weight percent of the sintered body.
16. The process of claim 12, where the CBN grains are 1 to 3 microns.

17. The process of claim 12, where the 60% of the CBN grains are 4 to 8 microns, 30% of the CBN grains are 12 to 22 microns, and 10% of the CBN grains 1-2 microns.
18. The process of claim 12, where the aluminum nitride grains comprise .5 to 1.5 weight percent of the mixture.
19. The process of claim 12, where the aluminum nitride grains are .3 to 1 microns.
20. The process of claim 12, where the aluminum grains comprise .5 to 1.5 weight percent of the mixture.
21. The process of claim 12, where the aluminum grains are less than 1.5 microns.
22. The process of claim 12, where the titanium grains comprise .5 to 1.5 weight percent of the mixture.
23. The process of claim 12, where the titanium grains comprise 3 to 6 weight percent of the mixture.
24. The process of claim 12, where the titanium grains are less than 1.5 microns.
25. The process of claim 12, where the diamond grains comprise 1.5 to 2.5 weight percent of the mixture.
26. The process of claim 12, where the diamond grains are .5 to 1.5 microns.
27. The process of claim 12, where the substrate is tungsten carbide.
28. The process of claim 12, where the vacuum is  $10^{-5}$  torr to  $10^{-6}$  torr.
29. The process of claim 12, where the temperature in vacuum is 1200 to 1350 degrees C.